(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 770 336 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**23.07.1997 Bulletin 1997/30**

(51) Int. Cl.[6]: **A23L 1/318**, A23L 1/314, A23B 4/28, A23B 4/12

(21) Application number: **95202882.7**

(22) Date of filing: **24.10.1995**

# (54) Meat incorporation

Rekonstituiertes Fleisch

Viande réformée

(84) Designated Contracting States:
**AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT SE**

(43) Date of publication of application:
**02.05.1997 Bulletin 1997/18**

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EP 0 770 336 B1

Printed by Rank Xerox (UK) Business Services
2.14.11/3.4

## Description

The present invention relates to a process for incorporating meat trimmings into meat.

Meat trimmings are obtained by removal from the meat during the standard preparation of whole cuts of meat in the meat industry. The trimmings are usually but not always of low quality and usually contain some fat and some muscle tissue. It is possible, by using technology introduced onto the market in recent years, to incorporate suspensions made of meat trimmings into whole cuts of like meat to increase the weight using a multi-needle injector. By controlling parameters such as the amount of trimmings injected, the meat/fat ratio and the quality of the meat, this technology enables the production of cooked ham or other marinated meat products without affecting the standard quality with regard to flavour, shelf-life and lack of visibility of the suspension, and in some cases improving it, for instance, with regard to binding and yield. Such a process is described in US-A-4,960,599. The cost saving of injecting trimmings is considerable when the trimmings are of low value compared to whole cuts of meat.

In order to impart a specificity to the flavour and to improve the microbiological stability, it has been proposed to ferment the raw marinated meat by using a starter culture in the brine or marinade prior to cooking to produce bacteriocins. However, since the raw marinated meat can under no circumstances be allowed to ferment at a temperature higher than about +8°C prior to cooking, the biggest problem is to find a starter culture that can produce bacteriocins and a specific flavour at low temperature. We have tested some commercially available cultures but the effect on the final quality of the product regarding flavour and microbiological stability is minimal.

In addition, the production time before the cooking step must be prolonged considerably.

We have found, surprisingly, that by applying the fermentation step with a starter culture in the meat trimmings prior to incorporation into meat, it is possible to adapt the fermentation parameters such as temperature, time, humidity and ingredients, etc. to their optimal values.

Accordingly, the present invention provides a process for preparing meat containing meat trimmings therein which comprises incorporating a frozen suspension of meat trimmings in a brine, marinate or pickle into chilled meat characterised in that before freezing, the meat trimmings are fermented with a starter culture.

The meat used in the process may be obtained from all types of meat such as pork, beef, lamb, poultry and fish. For example, raw whole cuts of meat may be chilled, e.g. to a temperature from -2° to 12°C, preferably from 2° to 10°C and especially from 3° to 8°C, deboned and the trimmings removed in the usual manner. The meat trimmings used are preferably those removed from the actual piece of meat to be treated but it is also possible to use trimmings from the same type of meat as the meat to be treated. It is also possible to use trimmings from a type of meat other than the meat to be treated, although this is generally less preferred.

The trimmings may be incorporated into trimmed whole meat cuts as such or into smaller portions of meat formed by dividing the whole meat cuts into pieces having an average diameter of from 0.5 to 10 cm, more conveniently from 1 to 5cm.

When the meat trimmings are incorporated into whole cuts of meat, this may be carried out conventionally by injection, using for instance a multi needle injector. When the meat trimmings are incorporated into smaller portions of meat, this may be carried out by mixing the meat trimmings with the smaller portions of meat, e.g. with agitation such as stirring or tumbling. For example, a suspension of the meat trimmings may be added directly to a tumbler.

Before fermentation,the meat trimmings are conveniently ground until the majority of their particles have a size of less than 30mm diameter and their average particle size is from 1mm to 5mm, preferably from 2mm to 4mm diameter.

Before, during or after the addition of the starter culture, the ground meat trimmings may be mixed with a brine, pickle or marinate. As is well known, a pickle is used for preserving meat and may contain brine, vinegar or other salt or acid liquor while a marinate is used for flavouring meat and may contain brine, vinegar or wine, oil, spices and herbs, etc. For instance, the ground meat trimmings may be mixed with sugar and a nitrite salt such as sodium nitrite. The pH of the mixture is usually in the range of from 5.2 to 6.3, preferably from 5.5 to 6.0. Suitable starter cultures may be obtained from Lactobacillus, Streptococcus or Pediococcus species and preferable strains are Lactobacillus sake (L.sake), Pediococcus acidilacti (P.acidilacti) and, e.g. salami. The starter culture may be mixed in water as is conventional before adding to the meat trimmings. The amount of starter culture used may be from 0.1 to 10ml, preferably from 0.5 to 5ml and especially from 0.75 to 2.5ml per kg of ground meat trimmings. The mixture of ground meat trimmings and the starter culture in the brine, pickle or marinate is advantageously packed in a vessel or bin suitable for fermentation such as a plastic bag or pouch within which fermentation is allowed to proceed. The fermentation may take place at a temperature from 0° to 55°C, preferably from 8° to 45°C and more preferably from 15° to 40°C over a period of from 12 hours to 7 days, preferably from 18 hours to 5 days. During the early stages of the fermentation, e.g. after a period of from 6 to 30 hours and more usually after a period of from 12 to 24 hours, the pH falls, for instance to from pH5.2 to 5.3 or below.

After the fermentation, the fermented ground meat trimmings are frozen, e.g. to a temperature from -5° to -30°C, preferably from -15° to -25°C. After freezing, the fermented ground meat trimmings are advantageously flaked, e.g. to particles having a maximum volume of about 2cc, preferably a maximum volume of 1cc.

After freezing, a frozen brine, pickle or marinate may be mixed with the fermented meat trimmings to form a suspension. The mixing may be performed by emulsifying one or more times, e.g. up to four times. The frozen brine may be at a temperature of 0° to -30°C and preferably from -5° to -12°C. The ratio of brine, pickle or marinate to the fermented meat trimmings may be from 1:1 to 20:1, preferably from 1.5:1 to 15:1 and more preferably from 2:1 to 9:1. For example a brine may consist of a mixture of nitrite salt, sugar, ascorbate and water. The nitrite and ascorbate salts are conveniently the sodium salts.

The frozen suspension of meat trimmings in a brine, marinate or pickle is then warmed to a temperature of not greater than +1°C, for instance about -2° to -10°C, preferably from -4° to -8°C and incorporated into the chilled meat. The temperature of the suspension should not exceed +1°C otherwise proteins would be extracted which would cause the suspension to thicken rapidly and this may cause subsequent clogging of the needles when the meat trimmings are injected into the meat with needles.

The amount of meat trimmings incorporated into the meat may vary, e.g. up to 15%, conveniently from 1 to 10% and preferably from 2 to 6% by weight based on the weight of the meat. During the incorporation of the suspension of the meat trimmings into the meat, especially by injection, a portion of the suspension of the meat trimmings is squeezed out of the meat and may be returned to the batch containing the mixture of trimmings with brine where it is chilled down again. Any portion of the suspension returned is preferably emulsified at least once, more preferably at least two or three times, with the next batch because it may contain small meat particles which are disrupted from the muscles during injection and which could cause clogging of the needles. When the meat trimmings are incorporated by injection, a part of the suspension of the meat trimmings are preferably added separately so that some may be absorbed during tumbling since it is not usually possible to incorporate the exact desired percentage of suspension by injection.

After the injection, the meat may be processed conventionally.

The meat product may be a chilled product which is either non-cooked or cooked, or it may be frozen, preferably marinated, or dried. Examples of non-cooked chilled meat products are Lardon, bacon, cold smoked ham, etc. An example of a cooked and chilled meat product is cooked ham. For a cooked, chilled product such as cooked ham, the meat may undergo tenderisation, tumbling, moulding, cooking, chilling, storage, slicing and packaging by conventional methods such as are well known in the art. The process of the present invention may provide protection against undesirable bacteria such as Listeria in chilled products and improved flavour in frozen and dried products.

The following Example further illustrates the present invention. Parts and percentages are by weight.

**Example 1**

A whole ham was chilled to 5°C and trimmed by removing fat, sinews, etc. before separating into different whole meat cuts. The trimmings removed from the whole ham, i.e. the fat, sinews, etc. were ground in a Kilia grinder to an average particle size of 3mm, mixed in a Hobart mixer with 2% dextrose, a mixture of 0.5% sodium nitrite and 0.5% sodium chloride, 1% sodium chloride, and 1.0% of a starter culture of L. sake containing $10^6$-$10^7$ bacteria per gram of trimmings. The mixture was packed into plastic pouches and fermented at 25°C for 36 hours. The pH fell rapidly during the first day from an initial value of pH6 to pH5.

After fermentation, the fermented mixture was packed into whole bags and frozen to -20°C, flaked in a magurit flaker to particles having dimensions of 0.5 x 0.5 x 0.5cm and warmed to -15°C. A brine at -8°C composed of 10.08% sodium nitrite, 0.18% of sodium ascorbate, 2.28% of dextrose and 87.46% of water (corresponding to an injection level of 40.5% and a 7% level of trimmings in the final product) was then mixed with the flakes of the fermented mixture in a ratio of 3 parts brine to 1 part of flakes. The mixing was carried out by emulsifying three times to form a suspension. The suspension was then injected at -6°C into one of the whole cuts of ham through a multi-needle injector and the ham containing the fermented meat trimmings was then subjected to tenderisation, tumbling, moulding, cooking, chilling, storage, slicing and finally packaging by conventional methods.

The chilled cooked ham had a longer shelf life and an improved flavour compared with a similar product containing meat trimmings which had not been fermented Furthermore, a similar product containing meat trimmings which had been fermented within the whole meat cut at 5°C had a shorter shelf life and an inferior flavour to the chilled cooked ham product as prepared in Example 1.

**Example 2**

A similar process to that described in Example 1 was followed except that the injection level of the suspension was only 17.3% instead of the 40.3% level used in Example 1 giving an addition of only 3% trimmings in the final product instead of 7% in Example 1.

The chilled cooked ham had a longer shelf life and an improved flavour compared with a similar product containing meat trimmings which had not been fermented. Furthermore, a similar product containing meat trimmings which had been fermented within the whole meat cut at 5°C had a shorter shelf life and an inferior flavour to the chilled cooked ham product as prepared in Example 2.

**Claims**

1. A process for preparing meat containing meat trim-

mings therein which comprises incorporating a frozen suspension of meat trimmings in a brine, marinate or pickle into chilled meat characterised in that before freezing, the meat trimmings are fermented with a starter culture.

2. A process according to claim 1 wherein the raw neat is chilled to a temperature from -2° to 12°C.

3. A process according to claim 1 wherein the meat trimmings used are those removed from the actual piece of meat to be treated.

4. A process according to claim 1 wherein the meat trimmings used are trimmings from the same type of meat as the meat to be treated.

5. A process according to claim 1 wherein the incorporation of the meat trimmings into whole cuts of meat is carried out by injection using a multi needle injector.

6. A process according to claim 1 wherein, before fermentation, the meat trimmings are ground until the majority of their particles have an average particle size less than 30mm diameter.

7. A process according to claim 1 wherein, before, during or after the addition of the starter culture, the ground meat trimmings are mixed with a brine, pickle or marinate.

8. A process according to claim 1 wherein the pH of the mixture containing the starter culture is in the range of from 5.2 to 6.3.

9. A process according to claim 1 wherein suitable starter cultures are obtained from Lactobacillus, Streptococcus or Pediococcus species.

10. A process according to claim 1 wherein the fermentation takes place at a temperature from 0° to 50°C over a period of from 12 hours to 7 days.

11. A process according to claim 1 wherein, after a period of from 12 to 24 hours of fermentation, the pH falls to 5.2 to 5.3 or below.

12. A process according to claim 1 wherein, after the fermentation, the fermented ground meat trimmings are frozen to a temperature from -5° to -30°.

13. A process according to claim 1 wherein, after freezing, the fermented ground meat trimmings are flaked to particles having a maximum volume of about 2cc.

14. A process according to claim 1 wherein, after freezing, a frozen brine, pickle or marinate is mixed with the fermented meat trimmings to form a suspension.

15. A process according to claim 1 wherein the ratio of brine, pickle or marinate to the fermented meat trimmings is from 1:1 to 5:1.

16. A process according to claim 1 wherein the frozen suspension of meat trimmings in a brine, marinate or pickle is then warmed to a temperature of not greater than +1°C and injected into the chilled whole cut of meat.

17. A process according to claim 1 wherein the amount of meat trimmings incorporated into the whole cut of meat is up to 15% by weight based on the weight of the whole cut of meat.

18. A process according to claim 1 wherein after the incorporation, the meat is chilled, frozen or dried.

19. A process according to claim 18 wherein the meat is cooked before being chilled.

**Patentansprüche**

1. Verfahren zum Zubereiten von Fleisch, das abgeschnittene Fleischstückchen enthält, wobei das Verfahren das Einbringen einer tiefgekühlten Suspension aus abgeschnittenen Fleischstückchen und Salzlake, Marinade oder Essigsauce in gekühltes Fleisch umfaßt, dadurch gekennzeichnet, daß die Fleischstückchen vor dem Tiefkühlen mit einer Starterkultur fermentiert werden.

2. Verfahren nach Anspruch 1, bei welchem das Ausgangsfleisch auf eine Temperatur von -2° bis 12°C gekühlt wird.

3. Verfahren nach Anspruch 1, bei welchem die verwendeten Fleischstückchen jene sind, die von dem zu verarbeitenden Fleisch selbst entfernt worden sind.

4. Verfahren nach Anspruch 1, bei welchem die verwendeten Fleischstückchen abgeschnittene Fleischstückchen von derselben Art Fleisch wie das zu verarbeitende Fleisch sind.

5. Verfahren nach Anspruch 1, bei welchem das Einbringen der Fleischstückchen in ganze Fleischschnitten durch Injektion unter Verwendung eines Mehrfachnadelinjektors ausgeführt wird.

6. Verfahren nach Anspruch 1, bei welchem die Fleischstückchen vor der Fermentierung gemahlen werden, bis der Großteil ihrer Teilchen eine mittlere Teilchengröße von weniger als 30 mm Durchmesser hat.

7. Verfahren nach Anspruch 1, bei welchem vor, während oder nach der Zugabe der Starterkultur die gemahlenen Fleischstückchen mit einer Salzlake, Essigsauce oder Marinade vermischt werden.

8. Verfahren nach Anspruch 1, bei welchem der pH-Wert der die Starterkultur enthaltenden Mischung im Bereich von 5,2 bis 6,3 liegt.

9. Verfahren nach Anspruch 1, bei welchem geeignete Starterkulturen von Lactobacillus-, Streptococcus- oder Pediococcus-Arten erhalten werden.

10. Verfahren nach Anspruch 1, bei welchem das Fermentieren bei einer Temperatur von 0° bis 50°C über eine Zeitspanne von 12 Stunden bis 7 Tage erfolgt.

11. Verfahren nach Anspruch 1, bei welchem nach einer Fermentationsdauer von 12 bis 24 Stunden der pH-Wert auf 5,2 bis 5,3 oder weniger fällt.

12. Verfahren nach Anspruch 1, bei welchem nach dem Fermentieren die fermentierten gemahlenen Fleischstückchen auf eine Temperatur von -5° bis -30°C tiefgekühlt werden.

13. Verfahren nach Anspruch 1, bei welchem die fermentierten gemahlenen Fleischstückchen nach dem Tiefkühlen zu Flocken mit einem maximalen Volumen von etwa 2 $cm^3$ verarbeitet werden.

14. Verfahren nach Anspruch 1, bei welchem nach dem Tiefkühlen eine tiefgekühlte Salzlake, Essigsauce oder Marinade zu den fermentierten Fleischstückchen hinzugemischt wird, um eine Suspension zu bilden.

15. Verfahren nach Anspruch 1, bei welchem das Verhältnis von Salzlake, Essigsauce oder Marinade zu fermentierten Fleischstückchen 1:1 bis 5:1 beträgt.

16. Verfahren nach Anspruch 1, bei welchem die tiefgekühlte Suspension aus Fleischstückchen und Salzlake, Marinade oder Essigsauce anschließend auf eine Temperatur von nicht mehr als +1°C erwärmt und in die gekühlte ganze Fleischschnitte injiziert wird.

17. Verfahren nach Anspruch 1, bei welchem die in die ganze Fleischschnitte eingebrachte Menge an Fleischstückchen bis zu 15 Gew.-%, bezogen auf das Gewicht der ganzen Fleischschnitte, beträgt.

18. Verfahren nach Anspruch 1, bei welchem nach dem Einbringen das Fleisch gekühlt, tiefgekühlt oder getrocknet wird.

19. Verfahren nach Anspruch 18, bei welchem das Fleisch gekocht wird, bevor es gekühlt wird.

**Revendications**

1. Procédé de préparation de viande contenant des parures de viande, qui comprend l'incorporation d'une suspension congelée de parures de viande dans une saumure, une marinade ou une liqueur de macération à de la viande réfrigérée, caractérisé en ce qu'on fait fermenter les parures de viande avec une culture d'amorçage avant la congélation.

2. Procédé suivant la revendication 1, dans lequel la viande brute est réfrigérée à une température de -2 à 12°C.

3. Procédé suivant la revendication 1, dans lequel les parures de viande utilisées sont des parures retirées du morceau réel de viande devant être traité.

4. Procédé suivant la revendication 1, dans lequel les parures de viande utilisées sont des parures provenant du même type de viande que la viande que l'on traite.

5. Procédé suivant la revendication 1, dans lequel l'incorporation des parures de viande aux morceaux entiers de viande est effectuée par injection au moyen d'un injecteur à aiguilles multiples.

6. Procédé suivant la revendication 1, dans lequel, avant la fermentation, les parures de viande sont hachées jusqu'à ce que la majorité de leurs particules ait un diamètre moyen inférieur à 30 mm.

7. Procédé suivant la revendication 1, dans lequel avant, pendant ou après l'addition de la culture d'amorçage, les parures de viande hachées sont mélangées avec une saumure, une liqueur de macération ou une marinade.

8. Procédé suivant la revendication 1, dans lequel le pH du mélange contenant la culture d'amorçage se situe dans la plage de 5,2 à 6,3.

9. Procédé suivant la revendication 1, dans lequel des cultures d'amorçage convenables sont obtenues à partir d'espèces des genres Lactobacillus, Streptococcus ou Pediococcus.

10. Procédé suivant la revendication 1, dans lequel la fermentation a lieu à une température de 0 à 50°C pendant une période allant de 12 heures à 7 jours.

11. Procédé suivant la revendication 1, dans lequel, après la période de fermentation de 12 à 24 heures, le pH tombe à 5,2-5,3 ou au-dessous.

12. Procédé suivant la revendication 1, dans lequel,

après la fermentation, le hachis de parures de viande fermentées est congelé à une température de -5 à -30°C.

13. Procédé suivant la revendication 1, dans lequel après la congélation, le hachis de parures de viande fermentées est transformé en flocons formant des particules ayant un volume maximal d'environ 2 $cm^3$.

14. Procédé suivant la revendication 1, dans lequel, après la congélation, une saumure, une liqueur de macération ou une marinade réfrigérée est mélangée avec les parures de viande fermentées pour former une suspension.

15. Procédé suivant la revendication 1, dans lequel le rapport de la saumure, de la liqueur de macération ou de la marinade aux parures de viande fermentées est de 1:2 à 5:1.

16. Procédé suivant la revendication 1, dans lequel la suspension réfrigérée de parures de viande dans une saumure, une marinade ou une liqueur de macération est ensuite réchauffée jusqu'à une température ne dépassant pas +1°C et injectée dans le morceau entier de viande réfrigéré.

17. Procédé suivant la revendication 1, dans lequel la quantité de parures de viande incorporée au morceau entier de viande va jusqu'à 15 % en poids sur la base du poids du morceau entier de viande.

18. Procédé suivant la revendication 1, dans lequel après l'incorporation, la viande est réfrigérée, congelée ou séchée.

19. Procédé suivant la revendication 18, dans lequel la viande est cuite avant d'être réfrigérée.